Field Sampling and Testing Plan

Remedial Design
Combe Fill
South Landfill

State of New Jersey
Department of Environmental Protection

November 1988

O'BRIEN & GERE

FIELD SAMPLING
AND TESTING PLAN

REMEDIAL DESIGN

COMBE FILL

SOUTH LANDFILL

STATE OF NEW JERSEY

DEPARTMENT OF ENVIRONMENTAL PROTECTION

NOVEMBER, 1988

O'BRIEN & GERE ENGINEERS, INC.
RARITAN PLAZA ONE
EDISON, NEW JERSEY

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1.01 Introduction

The Combe Fill South Landfill is located in Chester and Washington townships, Morris County, New Jersey (Figure 1). The Record of Decision (ROD) for this site has identified the following components of the site remedial design:

- shallow ground water recovery system
- on-site treatment of recovered ground water
- a multi-layered terraced cap
- an active gas collection/treatment system
- surface water controls

In order to develop the design criteria and provide the necessary data base for the Remedial Design, supplemental investigations will be conducted at the site. These investigations include: aquifer testing, fill delineation, gas testing, materials evaluation and treatability studies.

This Field Sampling and Testing Plan (FST Plan) outlines the goals, methodologies, procedures and logistics of the supplemental site investigatory activities. The sampling and testing plans for each of the above components is detailed in the following sections. Correspondences presenting comments and responses to the FST Plan are included in Attachment A.

SECTION 2 - AQUIFER PERFORMANCE TESTS

2.01 General

The goal of the aquifer performance tests is to determine the hydraulic characteristics of the saprolite layer as they relate to the design of a ground water recovery and treatment system. Through the implementation of four (4) separate aquifer performance tests, the transmissivity and specific yield of the aquifer will be calculated. In addition, the productive capacity of the pumping wells will be determined, to guide the selection of the proper pumping equipment for ground water recovery. Data from the aquifer performance tests will also be used to identify the radius of inflow for the test wells, thus enabling proper spacing of the recovery wells so that the contaminated ground water in the saprolite layer will be contained and collected.

The hydraulic conductivity data obtained from the aquifer performance tests, the ground water elevation measurements collected during this field program, and available information on overburden thickness will be used to evaluate the inflow of ground water to the site.

The tests will also evaluate the short term impact of ground water pumping in the saprolite layer on the bedrock aquifer. Water levels in nearby bedrock wells will be monitored during the saprolite aquifer tests to identify possible hydraulic connection between the two aquifers.

2.02 Program Description

Four (4) separate aquifer performance tests will be conducted on the saprolite aquifer. These tests will be conducted for a minimum of 48-hours. The selected test sites are shown on Figure 2. At each test

site, a test well and two (2) shallow ground water observation wells will be installed. The typical well spacings are shown on Figure 3. The test sites will be in the immediate vicinity of the existing monitoring wells. The existing monitoring wells only contain 10 ft. of screen while the saturated thickness o the saprolite is about 30 ft. Therefore the screen length of the existing monitoring wells is insufficient to accurately test the saprolite aquifer. Also the addition of observation wells will facilitate an accurate evaluation of the hydraulic characteristics of the saprolite by providing drawdown data in different directions and at different distances from the pumping well. Therefore test wells are deemed necessary to properly conduct the aquifer performance tests.

Ground water levels in the test wells, observation wells and existing wells will be recorded prior to pumping, during the aquifer performance test and the subsequent recovery period. Transmissivity and specific yield values will be determined for each test using conventional time-drawdown and distance-drawdown interpretation techniques, including type curve and semi-log methods. The data collected during the recovery period will be utilized to verify the results calculated during the pumping phase of the aquifer performance test.

2.03 Methodology

Four (4) test wells and the eight (8) observation wells will be installed following standard hollow-stem auger drilling techniques. Split-spoon samples will be collected, at a minimum, in five (5) foot intervals, at changes in lithology and at the discretion of the on-site hydrogeologist. These samples will be collected in accordance with ASTM Method D-1586-84 and field classified in accordance with the

Modified Wentworth Scale for unconsolidated soil classification. Each boring will be completed to the bedrock interface.

The drilling and well installations will be performed by a licensed New Jersey well driller. Wells will be installed in accordance with New Jersey Department of Environmental Protection (NJDEP) specifications for unconsolidated aquifers. Test Wells will be constructed of four (4) inch inside diameter schedule 40 PVC well screen attached to a 4 inch inside diameter threaded flush jointed schedule 40 PVC riser pipe. The screen slot size of 0.020 inch was based on an evaluation of grain size analyses completed during the Remedial Investigation. The observation wells will be constructed of two (2) inch diameter, schedule 40 PVC riser and slotted PVC well screen. The screen slot size will be the same as for the adjacent test wells. Each well will screen the entire saturated portion of the unconsolidated aquifer. The sand pack will extend a minimum of three (3) feet above the top of the well screen. A minimum of two (2) feet of bentonite pellets will be placed above the sand pack and the remainder of the boring will be sealed with a cement/bentonite grout. A locking steel protective casing will be installed over the PVC riser pipe. Drill cuttings will be screened with a photoionization detector (HNU Model PI-101 or equivalent). If the cuttings measure greater than 5 ppm above background the cuttings will be placed in secure containers and staged in a secure location on the landfill. All other drill cuttings will be left on the ground surface at the well site.

Following installation each well will be developed to remove fine sediments and to ensure good yielding test wells. The four (4) inch wells will be developed by surging and pumping and the two (2) inch

wells will be developed by pumping or bailing. The development waters will be discharged to the existing leachate retention pond on the top of the landfill. Following development, a short duration (1 to 2 hours) step pumping test will be performed on each test well. This test will be conducted to select the pumping rate for the aquifer performance tests. This preliminary work will also provide an understanding of the quantity of discharge water expected to be encountered. At this time it is assumed that all pumped waters will be discharged to the existing leachate retention pond located on the top of the landfill. This retention pond is at least 800 feet or more from the test locations and over 50 feet higher in elevation than the test locations. Therefore the discharge is not expected to impact the aquifer tests. Should the step test reveal larger volumes of water than expected or the potential for discharged water to reach surface waters at the site, an alternative approach for containment of discharge waters will be developed and presented to the NJDEP.

The aquifer performance test will be conducted using a submersible pump suitable for a four (4) inch well. The pump will be capable of meeting the required flow rate from the depth set for a continuous period of at least 48 hours. The pump will be powered by a portable generator.

Water level data in the unconsolidated formation will be recorded using an electric well probe and/or an Enviro-Labs, Inc. Data Logger. This Enviro-Labs system utilizes a microcomputer and up to eight pressure transducers to record ground water level data in real-time and to store the data in its memory. The pressure transducers will be dedicated to a well for the duration of each test. The system is powered

from an external 12 volt source. For the use of the Enviro-Labs Data Logger water level measurements will be periodically recorded using an electric well probe to verify the accuracy of the automatically recorded data.

Prior to initiating the aquifer performance test, water level measurements will be collected manually from all site shallow monitoring wells and the bedrock well adjacent to each test site to identify static water levels. During the pumping period and the recovery period of the test the ground water levels will be collected at a minimum at the following intervals:

Time Since Pumping Started or Stopped (min)	Intervals Between Measurements (min.)
0-10	0.5
10 - 30	1
30 - 60	5
60 - 120	15
120 - 240	30
240 - Termination	Variable based on rate of drawdown

This information will be collected to measure drawdown when the pumping is initiated and to measure recovery when the pumping is stopped. Recovery data will be collected until water levels approximate static conditions. During the actual pumping of the test well, the rate of ground water discharge in gallons per minute will be monitored hourly for the duration of the performance test using an inline meter.

2.04 Data Reduction

The data obtained will be evaluated to establish transmissivity and specific yield values for the aquifer using conventional distance-drawdown and time-drawdown methods. The recovery data will be used to verify the results of time-drawdown and distance-drawdown methods.

The time-drawdown method will consist of the semi-log plotting of data to be analyzed using Jacob's method and log-log plot to be analyzed using the type curve matching method for unconfined aquifers. The distance-drawdown method will involve the interpretation of plots of late time data points in order to evaluate the aquifer as a whole, eliminating the more variable early drawdown data. Interpretation methods are described by Driscoll, Fletcher G., 1986 Ground Water & Wells, Johnson Division, St. Paul, 23- pp.

The recovery test data will be utilized to verify the results obtained using the above methods. The recovery data will be evaluated using the semi-log plotting of data and subsequent analysis by Jacob's method as discussed in the above reference.

The radius of inflow for each test well will be estimated by evaluating ground water elevations around the test wells at the end of the pumping portion of the aquifer tests. In addition the radius will be calculated using the transmissivity and specific yield values developed from the tests and the static hydraulic gradient measured prior to the test. Methods of calculation will include an equation presented by Todd, D.K., Ground Water Hydrology, 1980, pp121-123 and an analytical ground water model which incorporates Theis' equation for calculating drawdown and static hydraulic gradient. In the Final Conceptual

Design Report, June 1987, by Lawler, Matusky & Skelly Eng. it is estimated that the total initial volume of ground water to be pumped by the shallow ground water recovery well system is about 116,000 gpd. Of this volume only 6,250 gpd or about 5% of the total volume is the result of ground water inflow into the landfill. It is apparent that the ground water inflow comprises only a minor portion of the total ground water volume to be pumped. Given that the inflow is a small percentage of the total ground water, it is not considered necessary to develop an accurate estimate of the inflow rate.

The ground water inflow rate will be estimated using two methods. One method will be to review the basis for the inflow rate presented in the Final Conceptual Design Report, June 1987. In that report the inflow rate was based on the estimated ground water recharge to the upgradient area. The values and assumptions used in calculating ground water recharge will be reviewed and modified if considered necessary. The second method for estimating ground water inflow will be the use of Darcy's Law Q=KiA. The hydraulic conductivity of the saprolite aquifer will be based upon the results of the proposed aquifer performance tests. In-situ permeability tests have been completed on the saprolite monitoring wells in the upgradient area of the site. Based on these results and the soil types described in the monitoring well boring logs, the aquifer test site with the most similar characteristics will be considered representative of the upgradient saprolite aquifer. The hydraulic conductivity value derived from that aquifer test will be used in the inflow calculation. The hydraulic gradient and aquifer thickness will be based on the boring logs and ground water elevation data. The length of the inflow area will be estimated based on ground water ele-

vation contour maps developed from past data and data collected during this study.

The higher value of the two inflow estimates will be used in the design of the recovery well system to provide a degree of safety to the design.

The results of the aquifer performance test will be presented in report format. Each method utilized to evaluate the data will be described with a summary of the values obtained provided. A copy of the hard data, supporting documents and the data plots with calculations will be included as attachments. A figure of actual test well locations will also be provided.

2.05 Schedule

The schedule for conducting the aquifer testing will be as presented in the approved work plan. The four (4) test wells and associated eight (8) observation wells have been installed and the well development and step tests have also been completed. Each of the four aquifer performance test will require an average of one week to conduct. This includes equipment preparation, internal review and calculation verification, mobilization and demobilization. The data reduction and report preparation is scheduled for a four (4) week period. The total time required for the completion of this task is about eight weeks.

The O'Brien & Gere personnel scheduled to perform this aspect of the Field Sampling and Testing Plan consist of Hydrogeologists, Project Hydrogeologists and Engineers from the Edison, New Jersey Office. Field personnel will report to the Senior Project Hydrogeologist in the Syracuse, New York office, who is responsible for this aspect of the

investigation. Data reduction will be performed by the Edison office reviewed by the Senior Project Hydrogeologist who will also verify all calculations.

SECTION 3 - FILL DELINEATION

3.01 General

The horizontal extent of fill material along the eastern side of the landfill has not been delineated. In order to facilitate the design of the site cap, the extent of the fill will be determined using two techniques, a geophysical survey method and test pits. The geophysical survey will consist of magnetometer and terrain conductivity meter traverses perpendicular to the suspected fill boundary. Following reduction of the field data, O'Brien & Gere will identify an estimated twelve (12) locations where test pits will be performed to verify the results of the geophysical surveys.

3.02 Methodology

The geophysical surveys will be conducted along a series of traverses perpendicular to the suspected fill boundary. The area to be surveyed is shown on Figure 4. Traverses will be performed at 200 foot intervals with readings taken at 20 feet intervals along each traverse. The traverse lines will be staked prior to conducting the field survey and subsequently the location of the traverses will be surveyed by the surveyor.

Equipment to be utilized for this geophysical survey shall consist of the EG&G Geometric Proton Magnetometer Model G-816/826 for the magnetometer survey and the Geonics EM-31 for the terrain conductivity survey. These instruments will be used in accordance with the manufacturer's specifications. Instrument readings along with notations on field surface conditions (i.e. ponded water, surface scrap metal,

fences, etc.). will be recorded in field notebooks. For the magnetometer survey, a base station will be established to monitor diurnal variations in the earth's magnetic field. Should such variations be identified, field readings will be adjusted accordingly. At each station three magnetometer readings will be taken and averaged to provide the data. Following completion of both surveys, the field instruments' data will be plotted against distance along the traverse. Based on the plotted data, the landfill boundary will be identified on the site plan.

Twelve (12) test pit locations will be selected to confirm the location of the landfill boundary. The proposed test pit locations will be presented to the NJDEP for approval. The test pits will be conducted using a rubber tired backhoe. The test pits will be excavated until fill material or native soil is encountered, whichever is shallower. Descriptions of the material encountered in the test pits will be noted in the field notebook and transferred to a Test Pit Log. Photographs of each pit will be taken to document the results of the excavation.

The results of the fill delineation program will be utilized in the design of the landfill cap. This information will be presented in a letter report format to the NJDEP for review and approval prior to initiating the preliminary cap design.

3.03 Schedule

The fill delineation activities will be performed during the period of time when other field activities will be conducted. The traverse locations have been staked and the geophysical surveys have been completed. Data reduction will require approximately one (1) week. The

test pits can be completed within one (1) week. Final compilation of data in a letter report suitable for NJDEP review will also require approximately one (1) week.

The O'Brien & Gere personnel scheduled to perform this aspect of the Field Sampling and Testing Plan consist of Hydrogeologists and Project Hydrogeologists from the Edison, New Jersey office. Field personnel will report to the Senior Project Hydrogeologist, who is responsible for this aspect of the investigation. Data reduction will be performed in the Edison, New Jersey office. This information will be reviewed by the Senior Project Hydrogeologist for accuracy and completeness.

SECTION 4 - GAS TESTING

4.01 General

In a landfill which has received municipal waste, gas is produced by the biological degradation of organic materials under anaerobic conditions. The gas typically contains between 40 and 50% methane. Gas generation commences upon waste deposition, reaches a peak between approximately six months and two years after deposition, and can continue for a period in excess of twenty years after waste deposition. Additionally, chemical wastes deposited at the landfill may emit potentially noxious gases during their natural degradation process. In order to ensure that the final cap over the Combe Site is not damaged by gas pressures, and to prevent the off-site migration of potentially explosive or otherwise harmful gas, the Record of Decision mandates that an active gas venting and treatment system be installed at the site.

To date, no field sampling has been conducted of gas being generated within the Combe Fill South Landfill. In order that the gas venting system and treatment system may be efficiently designed, a gas sampling program will be implemented. A series of short term extraction tests will be conducted. The primary objective of this testing is the collection of samples for chemical analyses for use in evaluating and designing a treatment system for the gas that will be vented by the full scale collection and treatment system. In addition, monitoring of the applied vacuum and flow rates during the short term testing will provide information useful in the evaluation of well spacing and required blower capacity for the full scale collection and treatment system.

4.02 Program Description

Up to two separate gas sampling tests will be conducted. The tests will be conducted for a minimum of eight (8) hours each. The selected test sites are shown on Figure 5. Wells will be placed in the fill as shown on Figure 5.

Each well will be pumped individually using a portable exhauster. Percent methane will be measured prior to and periodically during pumping using an explosimeter. Periodic readings will also be taken using an HNU photoionization detector. Samples collected periodically during the pumping will be analyzed for the following parameters:

Methane (%)

Carbon dioxide (%)

Carbon monoxide (%)

Oxygen (%)

Nitrogen (%)

TCL volatile organics

Total non-methane organics

Total chlorinated VOC

Hydrogen sulfide

Mercaptans

Sampling and analyses will be performed by Scott Enviromental Technology, Inc. The gas quantity being withdrawn from each well will be measured using a velometer, and pressure drops will be measured using a manometer.

The chemical analyses will be used in evaluating gas treatment alternatives. Optimum well spacing for use in the design of the full scale system and withdrawal rates will be evaluated using the data on gas flow rates.

4.03 Methodology

Two test wells will be installed using either hollow stem auger drilling techniques or cased rotary drilling techniques, depending on field conditions. Split-spoon samples will be collected at five foot intervals, at changes in lithology, or at direction of the on-site engineer. These samples will be collected in accordance with ASTM Method D-1586-84 and field classified in accordance with the Unified Soil Classification System. Each boring will be completed to a depth of fifty feet, or until ground water is encountered, whichever depth is shallower.

The drilling and well installations will be performed by a licensed New Jersey well driller. The wells will be constructed of four (4) inch diameter schedule 40 PVC riser. It is planned that the well be fitted with 0.06 inch slotted PVC well screen. This may be changed as site conditions are better defined during the aquifer testing program. Each well will be screened from the top of the ground water table encountered during drilling (or a depth of fifty feet, whichever is shallower), to five feet below the ground surface. The bottom of each well will be plugged. The annular space surrounding the well screen will be filled with a washed gravel having a grain size such that 90% is greater than 0.06 inches (or the selected slot size). The granular material will extend to one foot above the top of the screen. The annular space surrounding the well casing from the top of the granular backfill to three feet below the ground surface will be filled with a bentonite slurry. The well will be provided with a minimum stickup of three feet above grade and will be provided with a locking steel protective casing, the bottom of which is encased in a minimum of one foot of class C

concrete. The top of the well will be threaded, and provided with a four inch threaded plug.

If drilling mud is used in installation of the wells, the wells will be developed using water and/or air to remove any dried mud cake from the sides of the borehole in order that gas may flow freely to the well. Following any necessary development, static conditions will be periodically monitored using an explosive gas meter in an attempt to determine amounts of methane venting from the landfill naturally, and to provide a baseline against which to measure the results of the pump tests. This information will be used during the course of the testing program to monitor infiltration of atmospheric gases. If it is noted that the percent methane is significantly decreasing during the course of the test, the pumping rate will be decreased to minimizes the inflow of outside air. Periodic readings will also be taken using an HNU Photoionization Detector.

The pump tests will be conducted using a portable blower-exhauster such as a Coppus Portair Blower Exhauster with a 1/2 HP, 3500 RPM explosion proof motor. Similar equipment has been successfully used at other sites. Piping on the inlet side of the blower-exhauster will be fabricated to provide appropriate valving and outlets such that samples of gas being withdrawn from the well may be collected. Power will be supplied by a portable generator.

The blower exhauster will be set up and run for a period of a minimum of one week prior to collection of samples. Since a landfill may have up to 50% voids in which landfill gas may be stored, pumping of the well for this relatively short period of time prior to sampling will allow flow rates and chemical conditions in the vicinity of the well to

stabilize. Due to the short term nature of these tests, extracted gas will be vented through a carbon filter to the atmosphere. On the day selected for the test, up to three gas samples will be collected, one every two hours during the late morning and afternoon hours. Hourly measurements will be made of discharge rates of the blower using a velometer so that variations in flow rate may be monitored. Pressure drops will be monitored using a manometer. Percent methane will also be monitored using an explosive gas meter. The piping on the inlet side of the blower will be fabricated with a valve and sample tap to which a piece of tygon tubing may be attached.

Samples will be collected by filling one pre-screened five (5) liter Tedlar air bag per sample event. The Tedlar bags will be shipped to the laboratory for appropriate analyses. Following completion of the testing, the connecting pipes will be removed, the well head will be sealed with the threaded plug, and the locking caps secured.

4.04 Data Evaluation

Chemical data will be evaluated to aid in selection of treatment needs for gas vented by the full scale system. Alternatives to be evaluated will include scrubbers, carbon adsorption, flaring, and atmospheric discharge. Laboratory analyses of percent methane will allow correlations to be drawn to the values measured using the explosive gas meter.

In addition, collected data will be evaluated to aid in selecting appropriate well spacing. Gas production rates will be estimated using information on the refuse age, as well as quantities and typical gas generation rates per pound of refuse per year. Using the estimated

gas production rates and data on flow rates, pressure drops, and percent methane concentration, optimum well spacing will be evaluated.

Several equations utilizing measured vacuum and flow rates have been used for the theoretical evaluation of the radius of influence of a gas pumping well. One equation which can be utilized is presented in "Methane Generation and Recovery from Landfills" by Emcon Associates as follows:

$$Qw = \frac{K\P R^2 tDr}{C}$$

Where: Qw = Flow to an individual well

K = A compilation of conversion factors

R = Radius of influence

t = Refuse thickness

D = In place refuse density

r = Methane production rate

C = Fractional Methane Concentration

In order to solve for R, the radius of influence, the equation converts to:

$$R = \frac{QwC}{K\P tDr}$$

The air flow to the pumping well will be calculated based on the flow velocity measured in the field using a velometer and the known dimensions of the orifice through which the air is being vented. This calculation will be checked by measuring the vacuum at the well head with a manometer and utilizing the blower curve to determine the air volume being extracted. The compilation of conversion factors K is presented by Emcon as being 1.157×10^{-8} (L/day) (mL/sec.).

The refuse thickness in the areas of the well will be determined during installation of the test wells, other field work conducted by O'Brien & Gere and historical records. The inplace refuse density will be selected based on typical literature values. According to the "Handbook of Solid Waste Management" (Wilson 1977), residential waste may have densities ranging from 89 to 750 lb./cubic yard while industrial waste may have densities ranging from 50 to 2430 lb./cubic yard (excluding heavy metal scrap). Recognizing that both industrial and residential waste was accepted at Combe, a representative value of 1,100 lb./cubic yard will be used. As further discussed below, this parameter will be subjected to a sensitivity analysis.

A typical value for the methane production rate is presented in "Methane Generation and Recovery from Landfills" as 7ml/kg/day (1.12×10^{-4} cf/lb./day). A paper titled "Predicting Gas Generation Rates from Landfills" by Robert K. Ham indicated that a range from 3.1 to 37 l/kg/year (1.32×10^{-4} cf/lb./day to 1.58×10^{-3} cf/lb./day). Values in these ranges will be used in sensitivity analyses. The final variable in the equation is the fractional methane concentration which will be measured during the extraction testing.

It is recognized that there are several variables in this equation which are based on literature values. Other variables will be measured in the field at the well locations. In order that an efficient and appropriate design is prepared, a sensitivity analysis will be performed on the variables to insure that the calculated radius of influence is appropriate. In addition, other equations presented in the literature will be utilized to evaluate the collected data.

4.05 Schedule

Following the installation of wells for the aquifer testing detailed in Section 2, the gas test wells were installed. Monitoring of static conditions at each well will be conducted for one week prior to start up of the blower exhauster. The blower exhauster will be run for a minimum of one week prior to sample collection. Sample collection will require a day in the field, sample analysis will require six weeks, and evaluation of the collected data will require four weeks.

O'Brien & Gere personnel schedule to perform this portion of the field sampling and testing plan consist of hydrogeologists, engineers, and designers from both the Edison, New Jersey office and the Syracuse, New York office. Field personnel will report to the Project Engineer who is responsible for this aspect of the investigation. Data evaluation will be performed in the Syracuse office.

SECTION 5 - MATERIALS EVALUATION

5.01 General

Components of construction of the closure for the Combe Fill South Landfill will utilize a variety of materials. These include a number of natural soil materials to be used in the construction of roads, gabions, the gas venting system, and cap system. Synthetic materials will also be used in construction of these systems.

Synthetic materials of construction will likely include polyvinyl chloride (PVC), high density polyethylene (HDPE), polypropylene nylon, and galvanized steel.

Due to the variability in natural materials, it is proposed that sampling and analysis of available natural materials be conducted during this phase of the project. Since the chemical and structural qualities of synthetic materials are generally well documented, these materials will be evaluated based on published data.

5.02 Program Description

In order to identify material availability, a literature review will be conducted to locate likely sources of natural materials in the vicinity of the Combe Fill South site. Samples will be obtained from a number of the identified sources, and tested for appropriate chemical and physical properties. The results of these tests will be used during design of the various components of the closure plan.

Synthetic materials likely to be used during the remedial program will be evaluated based on published data relative to their chemical and physical properties. This information will be compared to site specific

chemical and physical requirements in order that appropriate materials may be selected.

5.03 Methodology

A review will be made of the availability of natural materials likely to be used during construction of the Combe Fill South site remedial program. The review will concentrate on materials available within a twenty mile radius of the site. Sources of information to be reviewed include, but are not limited to, available soils mapping of the area, the local United States Soils Conservation Service office, and local borrow pits.

Following this review, up to five potential borrow sources for granular materials will be identified. Bulk samples will be obtained from each potential borrow source and tested for mechanical grain size in accordance with ASTM-D422.

The cap to be placed over the site will likely incorporate a low permeability soil (clay) material. Based on the review of available materials, up to five sources of low permeability soil will be identified. A bulk sample from each source will be composited from three locations at least one hundred feet apart within each source. Each bulk sample will be analyzed for the following parameters:

Parameter	Standard
Mechanical and Hydrometric	
Grain Size	ASTM D422-63
Moisture Density Relationships	(15 Blow Modification to ASTM D698-78)

Remolded Permeability with Backpressure Saturation	U.S. Army Corps of Engineers Manual EM110-2 -1906 Appendix VII
Atterberg Liquid and Plastic Limits	ASTM D4318-73
Unconsolidated, Undrained (UU) Triaxial Shear Strength of Compacted Samples	ASTM D2850-82

It should be noted that the 15 blow modification to ASTM D698-57 (Standard Proctor Compaction) is to be used for testing of proposed cover soils. The Standard Proctor Compaction test calls for compaction of a sample in three equal layers in a standard mold. Each layer receives twenty five blows from a 5.5 pound hammer falling 12 inches. Under the 15 blow modification to this procedure, each layer receives only 15 blows which represents a lesser compactive effort. As presented in EPA Document 600/2-79-165 "Design and Construction of Covers for Solid Waste Landfills", this method models compaction of cover material on municipal solid waste more appropriately than the Standard Proctor Compaction test.

Although dispersivity, which is indicative of a clay with a high erosive potential is a concern, the initial review of potential borrow sources should indicate if the clay is likely to be dispersive. If the material is likely to be dispersive, or if its dispersivity is in question, double hydrometer dispersivity tests will be conducted. Shrink/swell behavior will be evaluated using well established empirical relationships relating percent swell to the activity, percent of particles finer than 2 microns and the plasticity index of a clay. Information to be used in

these relationships will be ascertained from the grain size and Atterberg limit testing.

The review of potential borrow sources will identify up to three potential sources of topsoil. A bulk sample from each source will be composited from three locations at least one hundred feet apart within each source. Each bulk sample will be analyzed for the following parameters.

pH	Copper
Magnesium	Iron
Phosphorous	Manganese
Potassium	Specific Conductance
Nitrate	Particle Size
Distribution (ASTM D422)	Ammonia
Organic Matter	
Moisture Density Relationship (ASTM D1557-78)	

The recommended chemical tests for topsoil are in accordance with Report No. EPA-600/2-83-055 "Standardized Procedures for Planting Vegetation on Completed Sanitary Landfills". Subsequent to selection of borrow sources for clay and topsoil based on the initial round of sampling and analyses for engineering and other properties, samples from the selected borrow sources will be tested for priority pollutant metals to preclude the use of chemically contaminated material.

The review of synthetic materials will evaluate strength and chemical properties of synthetic liners and geotextiles likely to be used in the closure design. Sources of information to be evaluated will include

manufacturers literature, industry publications, and Environmental Protection Agency literature.

5.04 Data Evaluation

Data obtained on the availability and properties of granular materials will be compared with anticipated requirements for the use of granular materials in construction of the gas venting system, access roadways, gabions, and as embankment material. This information will be used to identify likely sources of suitable granular material.

The analyses of low permeability soil will be will be evaluated in light of anticipated requirements for the low permeability soil portion of the final cover. As a result of this evaluation, likely sources of suitable cap material will be identified. Strength data will be used in developing design criteria to address slope stability.

Data on topsoil sources will allow evaluation of these sources so that appropriate vegetation may be selected and fertilizer requirements may be determined.

Properties of synthetic materials will be contrasted to site specific physical and chemical requirements in order that appropriate synthetic materials will be selected to address site specific needs.

5.05 Schedule

Materials evaluation will be performed during the period of time when other field activities are being conducted. It is anticipated that the review phase will require approximately four (4) weeks, the sampling phase will require approximately two (2) weeks, the analytic

phase will require approximately six (6) weeks, and the data evaluation phase will require approximately four (4) weeks.

O'Brien & Gere personnel scheduled to perform this aspect of the field sampling and testing plan consist of a design engineer and a project engineer. The review, sample collection and data evaluation will be performed in the Edison office, with all information being reviewed by the project engineer in the Syracuse office for appropriateness and accuracy. Sample analyses will be subcontracted to qualified laboratories.

SECTION 6 - TREATABILITY STUDIES

6.01 Background

Previous studies conducted at the Combe Fill South Landfill site resulted in the definition of a remedial approach comprising collection and treatment of ground water/leachate. The economic evaluation conducted as part of the RI/FS process concluded that ground water/leachate treatment should occur on-site and discharge should be to Trout Brook below the confluence of the East and West branches. The final conceptual design report included NJDEP Draft Effluent Limitations and expected influent characteristics (see Table 1). The objective of these proposed treatability studies is to determine technologies and design conditions appropriate to treat recovered ground water to expected effluent limitations.

6.02 Wastewater Characterization

A. Ground Water/Leachate Quality Data

Ground water data were developed during the remedial investigation for six shallow wells and eight leachate seeps surrounding the fill area. Table 2 presents the range of values determined as well as the mean for specific contaminants. Evaluation of specific contaminants is important for identifying appropriate treatment technologies as the removals for volatile and semivolatile compounds can vary considerably with the specific compounds present. Based on these data some preliminary comments concerning wastewater treatment are offered:

- Raw ground water BOD-5 is relatively low (100 mg/l).
- Raw ground water total suspended solids (TSS) are quite high (480 mg/l), assuming ground water recovery wells are designed and operated properly.
- Raw ground water Total Organic Carbon (TOC) is quite high given the projected BOD-5, suggesting the presence of materials which may not be easily degraded biologically.
- Raw ground water ammonia is quite high for ground water at 50 mg/l.
- Raw ground water volatile organics are at concentrations which are regularly removed by biological treatment facilities.
- Pesticides and PCBs have not been detected in any of the ground water or leachate samples.
- Reported heavy metal concentrations are quite low and within typical guidance for biological treatment system compatibility.
- Cyanides and phenols are at concentrations where biological treatment should be effective without supplemental pretreatment.

B. Supplemental Sampling and Analyses

The aquifer performance tests, Section 2, will be used to evaluate ground water quality under conditions more closely resembling the full-scale situation with appropriately designed and developed wells. Supplemental samples of ground water from the four proposed aquifer performance wells will be collected at 24 hours and 48 hours after commencement of each aquifer performance test.

An aliquot of each sample will be filtered in the field to determine the distribution of metals and total organic carbon (TOC) between the filterable and particulate fraction. In addition, the eight samples will be analyzed for the following parameters: total phenolics, volatile organics (EPA Methods 601,602), calcium, copper, chromium, iron, lead, magnesium, nickel, zinc, BOD-5, COD, TOC, pH (field), acidity, alkalinity, conductivity (field), Total Kjeldahl Nitrogen (TKN), ammonia, nitrate-nitrite, total phosphorus, total suspended solids, total dissolved solids, sulfate, dissolved oxygen (field), PCBs/pesticides (EPA Method 608), cyanide, total and fecal coliform, beryllium, cadmium, selenium, silver, and thallium. All analyses associated with the treatability tests will be completed by U.S. Testing of Hoboken, New Jersey, an NJDEP approved, RCRA - permitted laboratory.

6.03 Preliminary Evaluation of Alternatives

A. Appropriate Unit Operations

The data presented in Table 2 indicate that treatment must provide for the removal of: BOD-5, suspended solids, TOC, ammonia, volatile organics, metals, and total phenolics. Several operations are capable of removing each of these contaminants; however, the selected approach should minimize construction and operational costs where possible.

The Conceptual Design Report (LMS 1987) suggested the following operations: equalization, chemical precipitation, biological treatment, dual media filtration, and carbon adsorption. Recent studies (1, 2) have demonstrated the cost effectiveness of using

powdered activated carbon (PAC) assisted biological treatment for contaminated ground water/leachate treatment. This technology utilizes a single reactor to perform operations previously requiring three operations: biological; filtration; and adsorption. Results of testing at Stringfellow quarry and Midstate landfill demonstrated BOD-5 removals of 85 to 90 percent and ammonia removals of greater than 99 percent (3). Data from Bofors-Nobel demonstrated ammonia reductions from 150 mg/l to less than the detection limit of 10 mg/l (1). These studies also support the removal of volatile organics by mechanisms other than air stripping within the biological reactor, and the removal of heavy metals.

Recent studies (4) have presented results which suggest that additional improvements in performance can be obtained by combining the PAC concept with the use of a sequencing batch reactor (SBR). Such a system reportedly provided excellent effluent quality, operational flexibility, and low operator attention. Data presented indicate that TOC, BOD-5 and phenol removal rates on the order of those required for this site are achievable using this technology. Based on these considerations, the bench scale testing for biological treatment will focus on SBR rather than other biological treatment processes.

It will be necessary to specifically test bench-scale versions of other biological treatment processes (e.g., activated sludge or rotating biological contactors (RBCs)), since the bench scale SBRs will adequately model potential biodegradability. Activated sludge system or RBCs could be designed based on these treatability

studies, through SBRs would probably be recommended based on cost, assuming biodegradation is readily accomplished.

Based on this evaluation, the process schematics presented on Figure 7 will be evaluated. Because information derived from bench scale tests for Alternatives A, C, and D can be used to evaluate Alternative B, no specific testing will be conducted on Alternative B. Specifically, Alternative D should simulate the metals removing capabilities of Alternative B. It is anticipated that some materials utilized and generated during the treatability testing may be disposed on-site.

6.04 Treatability Testing

Treatability testing will be conducted in the pilot study facilities within O'Brien & Gere's Syracuse office. Ground water samples will be obtained every other week by pumping from monitoring wells. Pumped ground water will be batch treated for metals removal. The resulting supernatant will be refrigerated and gradually pumped through the aerobic biological reactors. The source(s) of ground water will likely be monitoring well S-3 and/or monitoring well S-1.

A. Coagulation, Flocculation, and Sedimentation

The metal concentrations reported for shallow ground water wells are quite low relative to solubility limits for metal hydroxides as illustrated in Figure 6. Addition of iron salts with pH adjustment often results in co-precipitation of metals with the iron floc. Ferric sulfate ($Fe_2(SO_4)_3$) will be the iron salt evaluated. Jar tests will be conducted to determine the effect of pH (8.5, 9.5, 10.0) and ferric sulfate dosage (50 mg/L, 100mg/L, 200 mg/L) on

the filterable concentration of the metals. Analyses to be conducted as part of the jar test program will include TSS, pH and selected metals. When a chemical addition process has been established, a column test will be conducted to evaluate polyelectrolyte addition, settling velocities, solids generation rates, and anticipated effluent quality. The established chemical addition process will be operated on a batch basis to generate influent for the biological treatability testing. Approximately 100 gallons of chemically pretreated shallow ground water will need to be generated over the course of the biological treatment bench scale testing.

B. Biological Treatment

Three side by side reactors will be used to evaluate the performance of the alternatives. Each reactor will be operated in a fill and draw mode to simulate a sequencing batch reactor (SBR) design. Reactors A and C will receive effluent from the chemical addition pretreatment. Reactor D will receive untreated ground water. A total of approximately 150 gallons of shallow ground water will be biologically pretreated.

The three reactors will be operated at similar hydraulic retention times (24 hr.) and mean cell residence times (40 days). Powdered activated carbon (PAC dose of 125 mg/L) will be added to Reactors C and D. The three reactors will be operated for a period of approximately three months.

The PAC dosage of 125 mg/l has been selected based on known ground water characteristics and on empirical evidence. Other dosages may also prove effective. It is conceivable that a higher dosage may prove more effective. This possibility will be

evaluated during testing and dosing may be adjusted accordingly should performance be adequate. The prospect of a lower, effective dosage should be tested in the field with the full-scale system.

The analytical program will include filterable TOC, TSS, pH, and filterable ammonia as routine operating parameters on a weekly basis. Supplemental analyses for BOD-5, metals, total phenolics, and NJDEP "toxic" organics will be analyzed on a weekly basis when the systems have achieved steady state conditions.

Achievement of steady state will be determined by tracking of MLVSS levels and effluent TOC levels. Microscopic examination of biomass will be performed occasionally to qualitatively track microbial population balance, as a further means of identifying steady state conditions.

C. Polishing Filtration

Supernatant from the reactors will be analyzed for TSS to estimate a loading range on the polishing filters. A bench scale filtration test using commercially available media will be used to evaluate surface loading rates and filter performance.

Filtrate will be tested for BOD-5, TSS, TOC, pH, ammonia, metals, and phenolics. Analyses for organics (EPA 601/602) will only be conducted if these substances are present in the effluent from the bench scale biological reactors.

D. Granular Activated Carbon Adsorption

Effluent from the Alternative A polishing filter will be used to conduct a series of carbon adsorption isotherms if organics (EPA 601/602) are detected in the filtrate and/or if the TOC

concentration of the filtrate exceeds the proposed NJDEP draft monthly average TOC concentration of 10 mg/L. The isotherms will be conducted using established protocols (5). Established EPA protocols for analytical testing of organics and/or for TOC will be followed.

E. Air Stripping

Effluent from the Alternative A polishing filter will be used to perform air stripping tests with a small column packed with ceramic saddles. Influent and effluent samples will be tested by EPA Method 601 and 602 and for TOC.

F. Effluent Testing

Effluent from the wastewater treatment approach which appears to be the optimal approach during the latter part of the treatability testing program will be bioassayed (duplicate samples) to assess potential discharge toxicity.

G. Solids Handling

Each treatment alternative will generate solids requiring management. Solids generated by the treatment alternatives will be quantified. According to the Conceptual Design Report (LMS 1987) the Parsippany-Troy Hills Wastewater Treatment Plant (PTHWWTP) has excess solids handling capacity. PTHWWTP officials will be contacted to explore the option of processing Combe Fill South Landfill on-site WWTP sludge with PTHWWTP sludge in the PTHWWTP solid handling facilities. The addition of solids generated from any of the treatment alternatives to the PTHWWTP solids may affect the solids dewatering and disposal methods normally employed at the PTHWWTP.

Three composite sludge samples and a control will be prepared. Each composite sample will consist of a mixture of one particular treatment alternative's solids and PTHWWTP solids in a ratio based upon the known or expected generation rates of the two sludges. Testing will include use of chemical addition rates currently employed at the PTHWWTP, with dewaterability assessed based on filter leaf tests. The control sample will comprise only PTHWWTP solids.

To evaluate the impact of the addition of landfill related solids on disposal options, filter cake from each of the four tests will be characterized. Analyses will include heavy metals present in shallow ground water, as well as (EPA 601/602) organics.

6.05 Data Evaluation and Presentation

A treatability report will be prepared presenting the procedures and results of the testing. Included in the report will be a discussion of the results and a detailed evaluation of alternatives. The detailed evaluation will present a review of the applicability of these approaches to this type of wastewater, treatability test results, and an economic evaluation of each alternative. One alternative will be recommended and a basis of design prepared identifying major equipment items, sizes, and materials of construction.

REFERENCES

1. (Meidel and Peterson, 1987)
"The Treatment of Contaminated Groundwater and RCRA Wastewater at Bofors-Nobel, Inc.", John A. Meidel and Ronald L. Peterson, 4th National RCRA Conference on Hazardous Waste and Hazardous Materials (HMCRI), Washington, D.C., March 16-18, 1987.

2. (Meidel and Vollstedt, 1986)
"Use of Powdered Carbon to Treat Contaminated Groundwater and Leachate", John A. Meidel and Thomas J. Vollstedt, Haztech International, Denver Colorado, August 13, 1986.

3. (Zimpro, 1987)
Zimpro flyer "Landfill Leachates"

4. (Ying, et. al., 1987)
"Treatment of a Landfill Leachate in Powdered Activated Carbon Enhanced Sequencing Batch Bioreactors", Wei-chi Ying, Robert Bonk, Stanley A. Sojka, Environmental Progress, February, 1987.

5. (Dobbs, et. al., 1980)
"Carbon Adsorption Isotherms for Toxic Organics", Richard A. Dobbs and Jesse M. Cohen, EPA - 600/8-80-023.

Tables

O'BRIEN & GERE

TABLE 1

NJDEP DRAFT EFFLUENT LIMITATIONS AS COMPARED TO EXPECTED INFLUENT CHARACTERISTICS

Combe Fill South Landfill

COMPONENT	EFFLUENT LIMITATIONS	EXPECTED AVERAGE INFLUENT CHARACTERISTICS
Conventional Parameters		
Biochemical oxygen demand, 5 day (BOD_5)	8.0 mg/l monthly average 12.0 mg/l weekly average 20.0 mg/l daily maximum 90% removal efficiency	100 mg/l
Total suspended solids (TSS)	8.0 mg/l monthly average 12.0 mg/l weekly average 20.0 mg/l daily maximum 85% removal efficiency	480 mg/l
Total organic carbon (TOC)	10.0 mg/l monthly average 20.0 mg/l daily maximum	510 mg/l
pH	6.5 - 8.5	7.0
Dissolved oxygen (DO)	7.0 mg/l at any time	-
Ammonia, as nitrogen (NH_3-N)	1.0 mg/l monthly average[a]	50 mg/l
Bioassay	No measurable acute toxicity	-
	96-hr LC_{50} < 10% mortality in all samples, including 100% treatment effluent	-
Ames Test	(No numerical limit for mutagenicity)	-
Priority Pollutants		
Volatile and semivolatile organics (NJDEP "toxic" organics)	ND or <5 ppb, for any single compound, daily maximum	300 ppb
Polychlorinated biphenyls (PCBs)	ND or <0.1 ppb, daily maximum	ND
Pesticides	ND or <1.0 ppb, daily maximum	ND
Heavy metals	ND or <50 ppb, total for all metals, daily maximum	710 ppb
Total phenolics	ND or <50 ppb, daily maximum	210 ppb
Total cyanide	ND or <20 ppb, daily maximum	24 ppb

[a]Possible allowances for seasonal variations not quantified.

ND = not detectable.

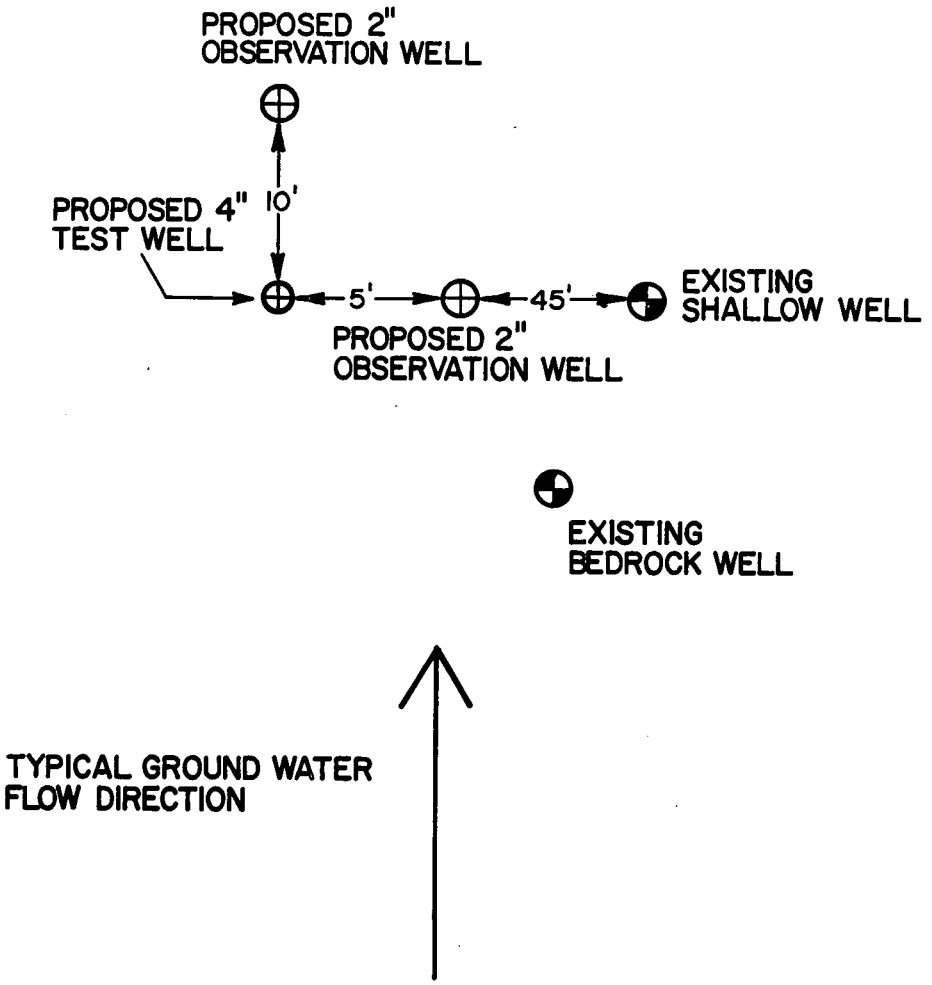
TABLE 2
TREATABILITY TESTING
WASTEWATER CHARACTERISTICS

	SHALLOW GROUND WATER			LEACHATE COMPOSITE		
PARAMETER	MINIMUM	MAXIMUM	MEAN	MINIMUM	MAXIMUM	MEAN
VOLATILES (ppb)				15.0	1084.0	261.7
Benzene	0.0	80.2	26.4			
Chlorobenzene	0.0	30.3	11.6			
Chloroethane	0.0	62.0	12.0			
Chloroform	0.0	57.5	9.6			
1,1-Dichloroethane	0.0	65.2	20.2			
1,2-Dichloroethane	0.0	6.1	1.0			
1,1-Dichloroethylene	0.0	0.0	0.0			
1,2-Dichloropropane	0.0	6.0	1.0			
Ethylbenzene	0.0	7.2	1.2			
Methylene chloride	4.44	56.0	16.1			
Tetrachloroethylene	0.0	4.1	0.7			
Toluene	0.0	137.0	239.7			
Trans-1,2-dichoroethylene	0.0	8.0	1.3			
Trichloroethylene	0.0	4.0	0.7			
Vinyl Chloride	0.0	10.0	1.7			
ACID/PHENOLICS (ppb)				0.0	7.0	1.8
2,4-Dimethylphenol	0.0	0.0	0.0			
2-Nitrophenol	0.0	0.0	0.0			
Phenol	0.0	1.5	0.3			
BASE/NEUTRALS (ppb)				2.0	71.0	34.5
Bis(2-chloroethyl)ether	0.0	5.8	1.8			
Bis(2-ethylhexyl)phthalate	0.0	11.0	3.5			
1,2-Dichlorobenzene	0.0	9.77	2.8			
1,4-Dichlorobenzene	0.0	39.4	8.3			

TABLE 2 (CONT'D.)
TREATABILITY TESTING
WASTEWATER CHARACTERISTICS

	SHALLOW GROUND WATER			LEACHATE COMPOSITE		
PARAMETER	MINIMUM	MAXIMUM	MEAN	MINIMUM	MAXIMUM	MEAN
BASE/NEUTRALS (ppb) Cont'd.				2.0	71.0	34.5
Di-ethyl phthalate	0.0	10.2	1.7			
Di-n-butyl phthalate	0.0	11.0	3.5			
Di-n-octyl phthalate	0.0	0.0	0.0			
Isophorone	0.0	0.0	0.0			
Naphthalene	0.0	3.2	0.5			
N-nitrosodiphenyl amine	0.0	0.0	0.0			
PESTICIDES/PCBs (ppb)				0.0	0.0	0.0
METAL (ppb)				60.0	3180.0	700.0
Beryllium	0.0	2.0	0.3			
Cadmium	0.0	3.0	0.5			
Chromium	0.0	30.0	13.3			
Copper	10.0	40.0	20.0			
Lead	9.0	28.0	16.7			
Mercury	0.0	0.2	0.1			
Nickel	0.0	30.0	11.5			
Selenium	0.0	5.0	0.8			
Silver	0.0	10.0	4.8			
Thallium	0.0	5.0	1.7			
Zinc	0.0	240.0	78.3			
MISCELLANEOUS (ppb)						
Cyanides	0.0	0.0	0.0	0.0	47.0	24.0
Phenols	0.0	270.0	45.0	0.0	418.0	212.7

FIGURE 3

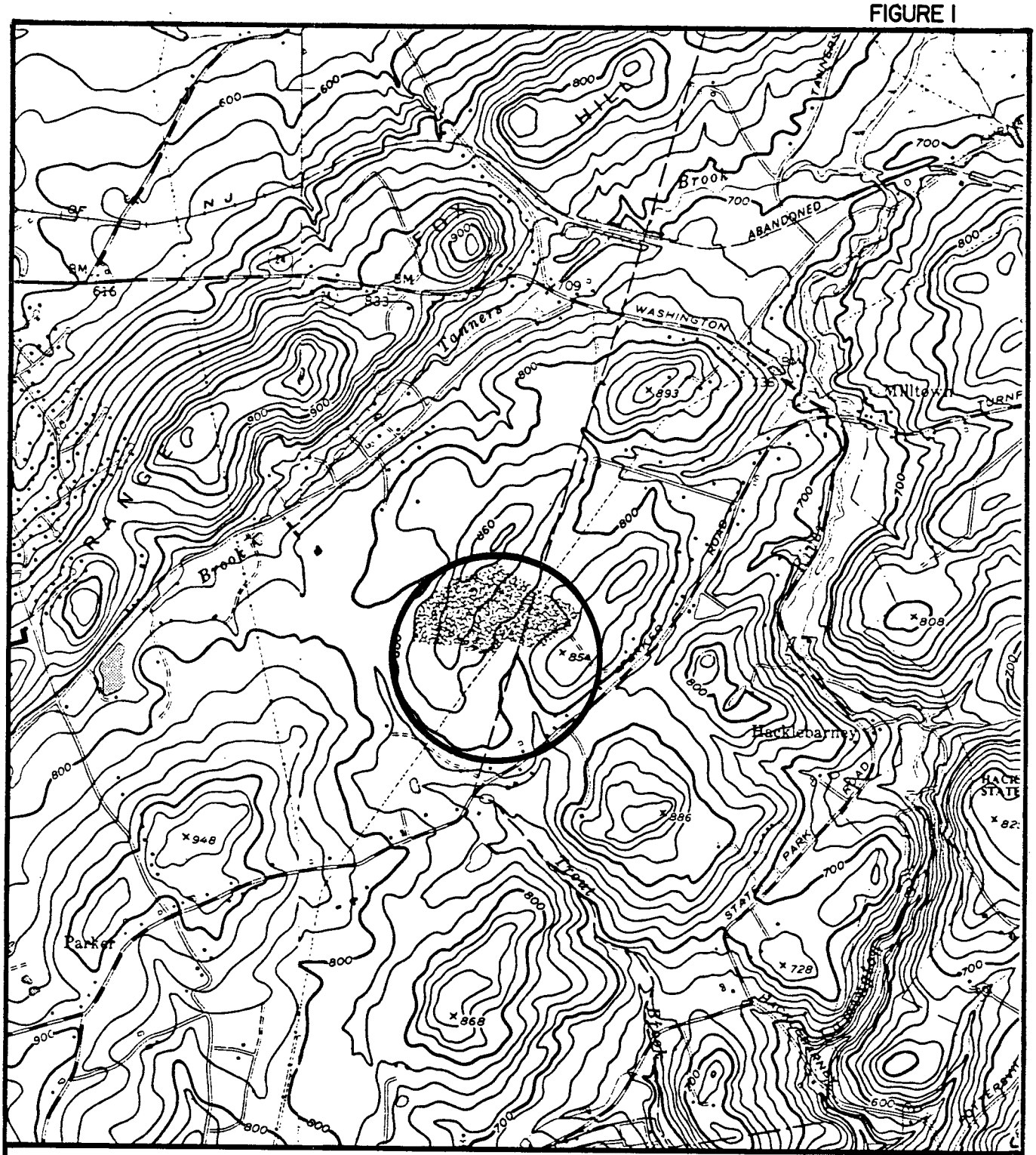


O'BRIEN & GERE
ENGINEERS, INC.
Syracuse, New York

TYPICAL TEST WELL SITE CONFIGURATION

COMBE FILL, SOUTH LANDFILL
CHESTER AND WASHINGTON TWPS., NEW JERSEY

FIGURE I



THIS MAP TAKEN FROM THE HACKETTSTOWN / CHESTER USGS QUADRANGLE MAPS.

FIGURE I

COMBE FILL SOUTH LANDFILL

LOCATION MAP

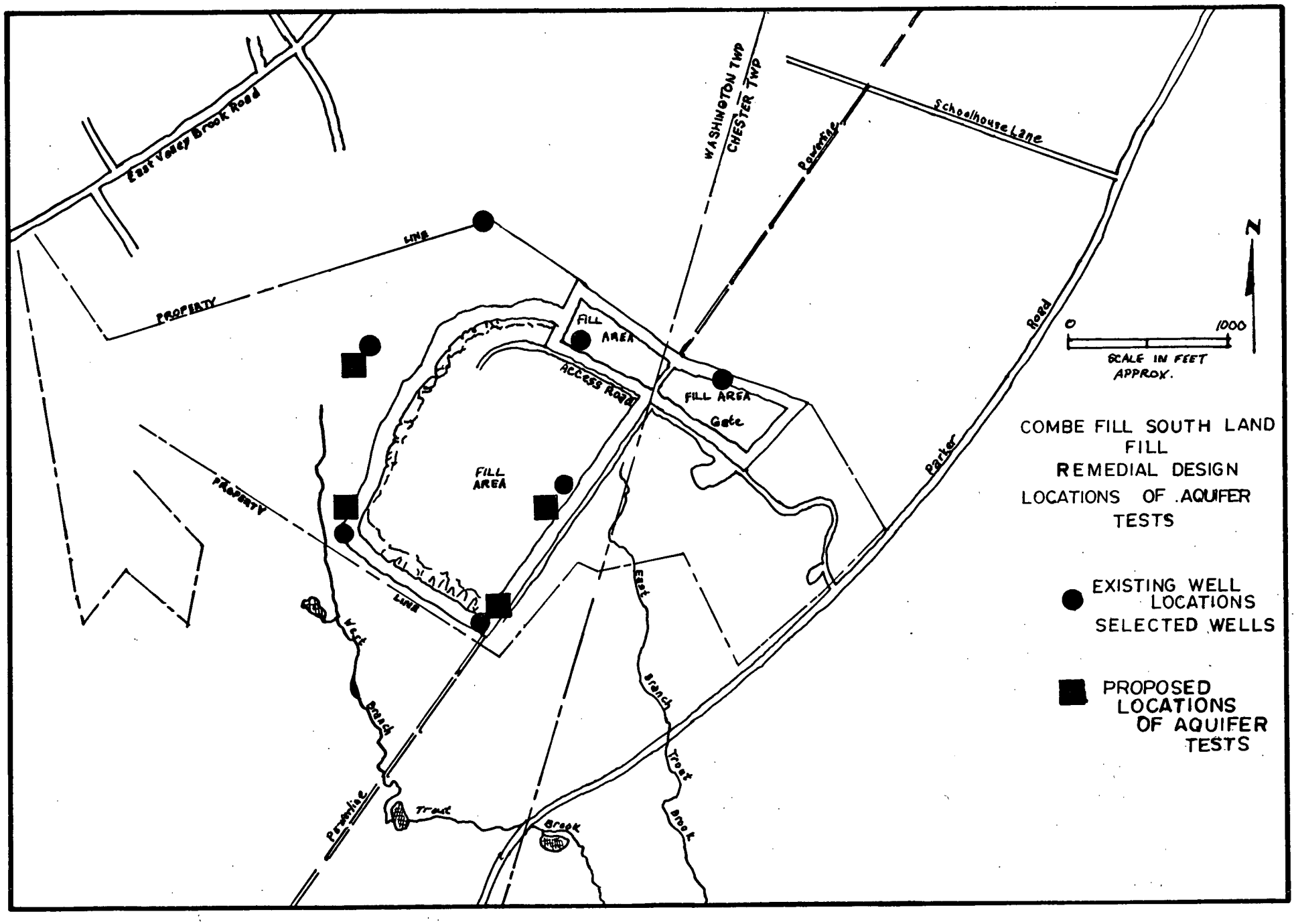
SCALE 1"=2000'

O'BRIEN & GERE ENGINEERS INC.

Figures

O'BRIEN & GERE

FIGURE 2



O'BRIEN & GERE ENGINEERS, INC.

FIGURE 4

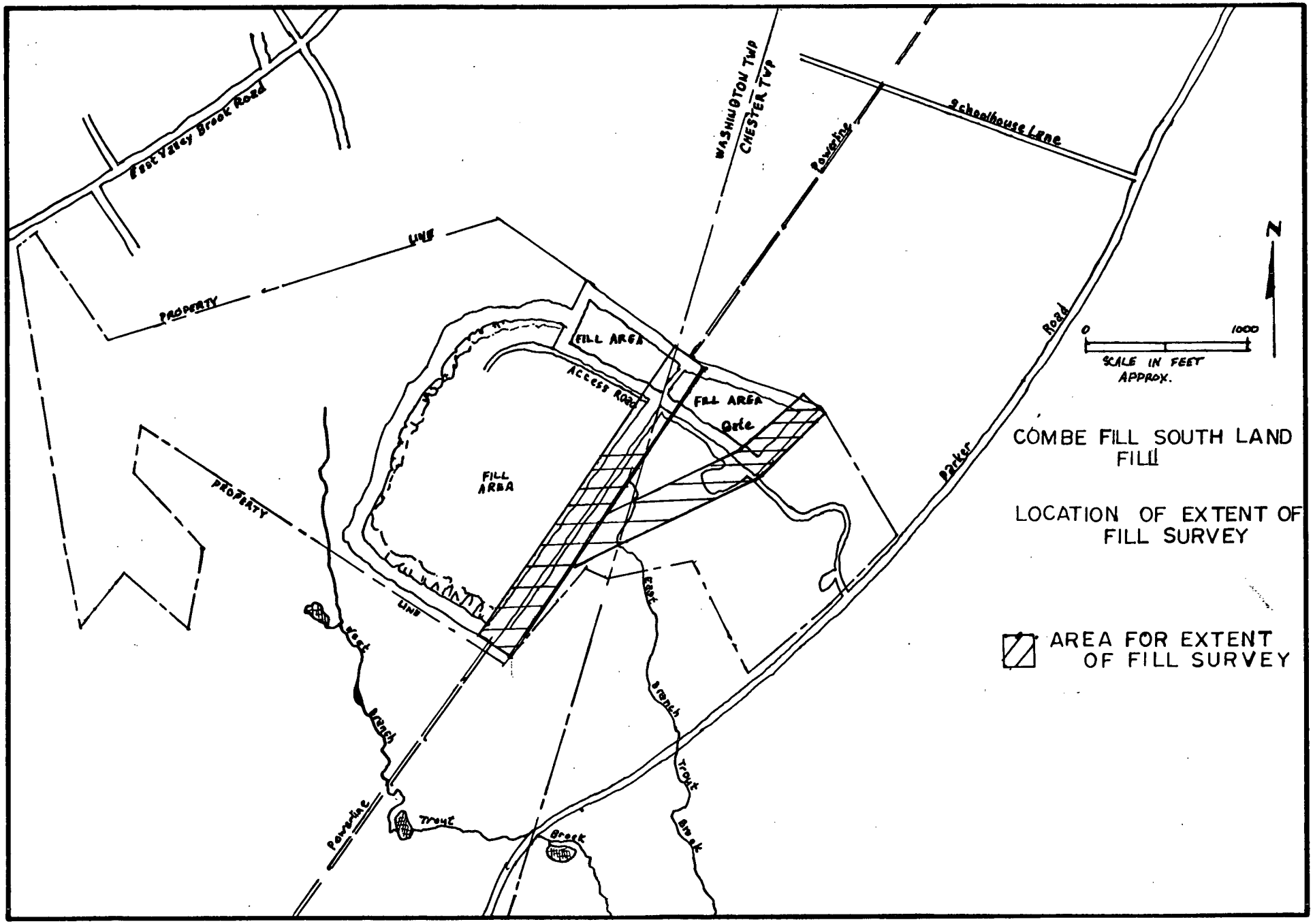


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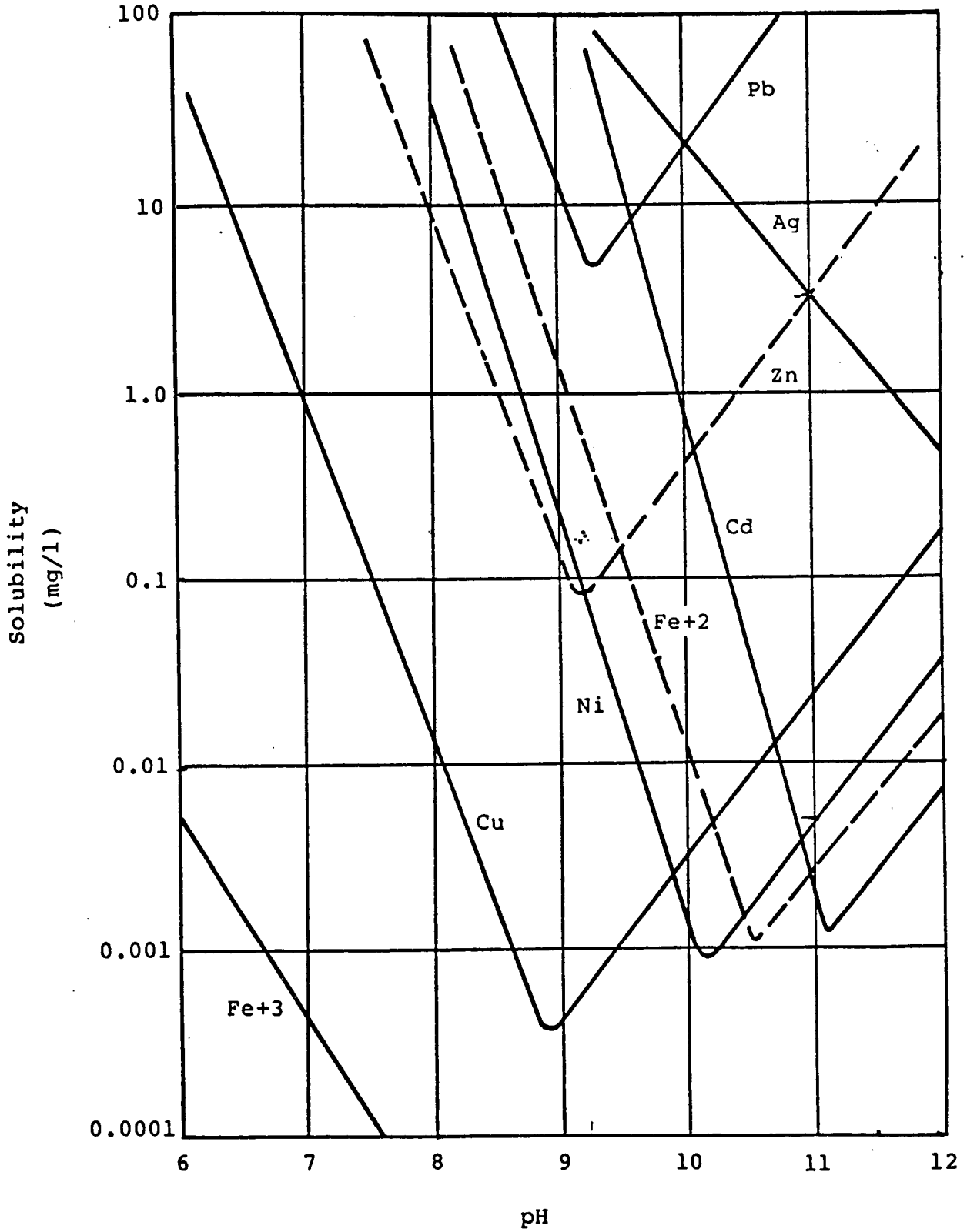
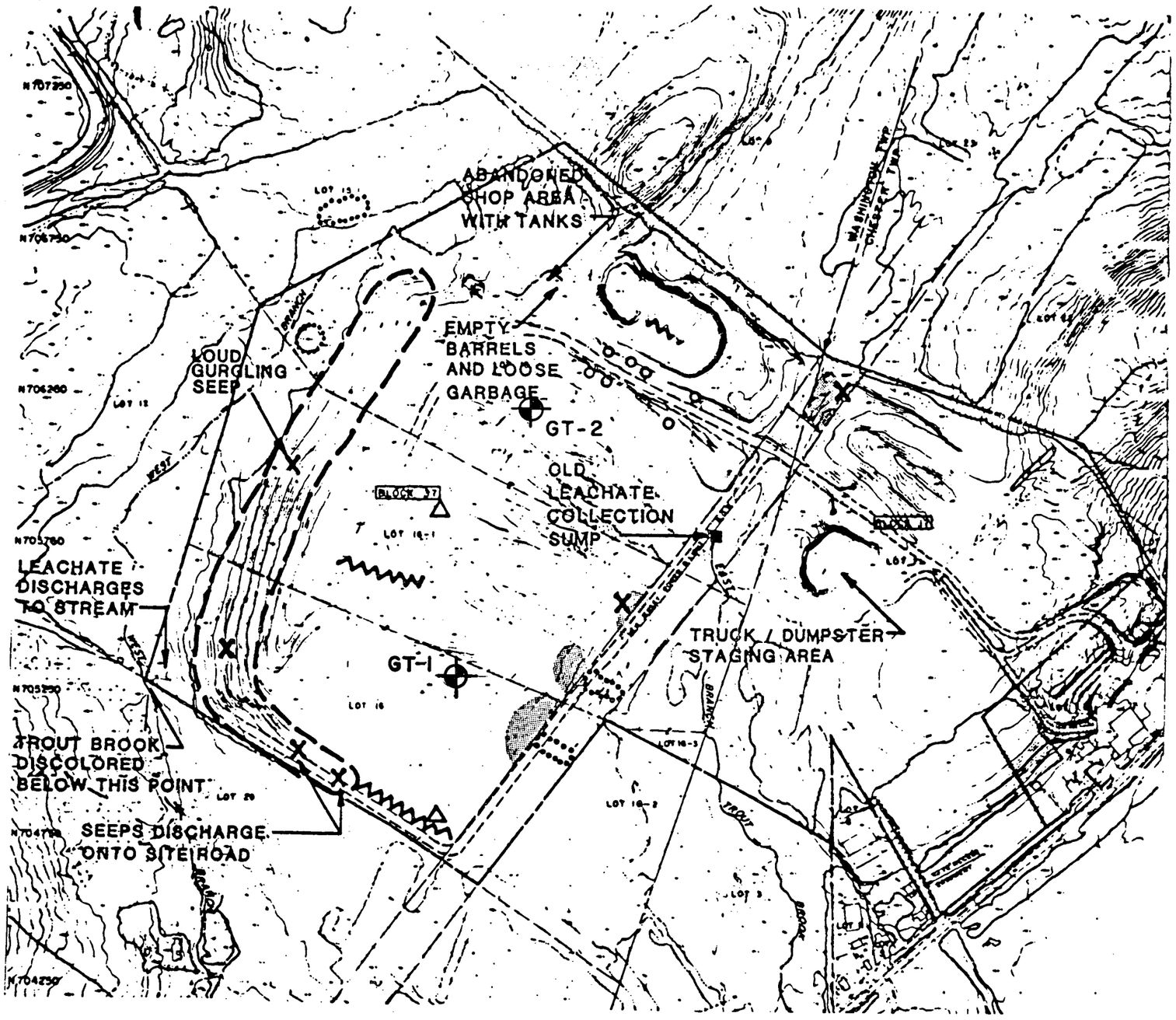
Figure 6



SOLUBILITIES OF METAL HYDROXIDES AS A FUNCTION OF pH

SOURCE: USEPA, 1985. DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS FOR THE METAL FINISHING POINT SOURCE CATEGORY. EPA 440/1-83/091

FIGURE 5



NOTES:

1. GAS TEST WELLS LOCATIONS TO BE VERIFIED IN FIELD.
2. SITE MAP BASED ON MAP DEVELOPED BY LAWLERS, MATUSKY SKELLY ENGINEERS.

LEGEND

- COMBE FILL SOUTH LANDFILL PROPERTY BOUNDARY
- RIFT
- GATE
- DRUMS
- LEACHATE SEEP
- AREA WITH STRONG ORGANIC VAPOR
- SWAMP AREA
- STANDING WATER
- AREA OCCUPIED BY NUMEROUS SEEPS
- GAS TEST WELL

COMBE FILL SOUTH LANDFILL
REMEDIAL DESIGN

SEPTEMBER 1988

GAS TEST WELL LOCATIONS

400 0 400
Scale in feet.

O'BRIEN & GERE

GROUND WATER/LEACHATE TREATMENT
Alternative Process Schematics

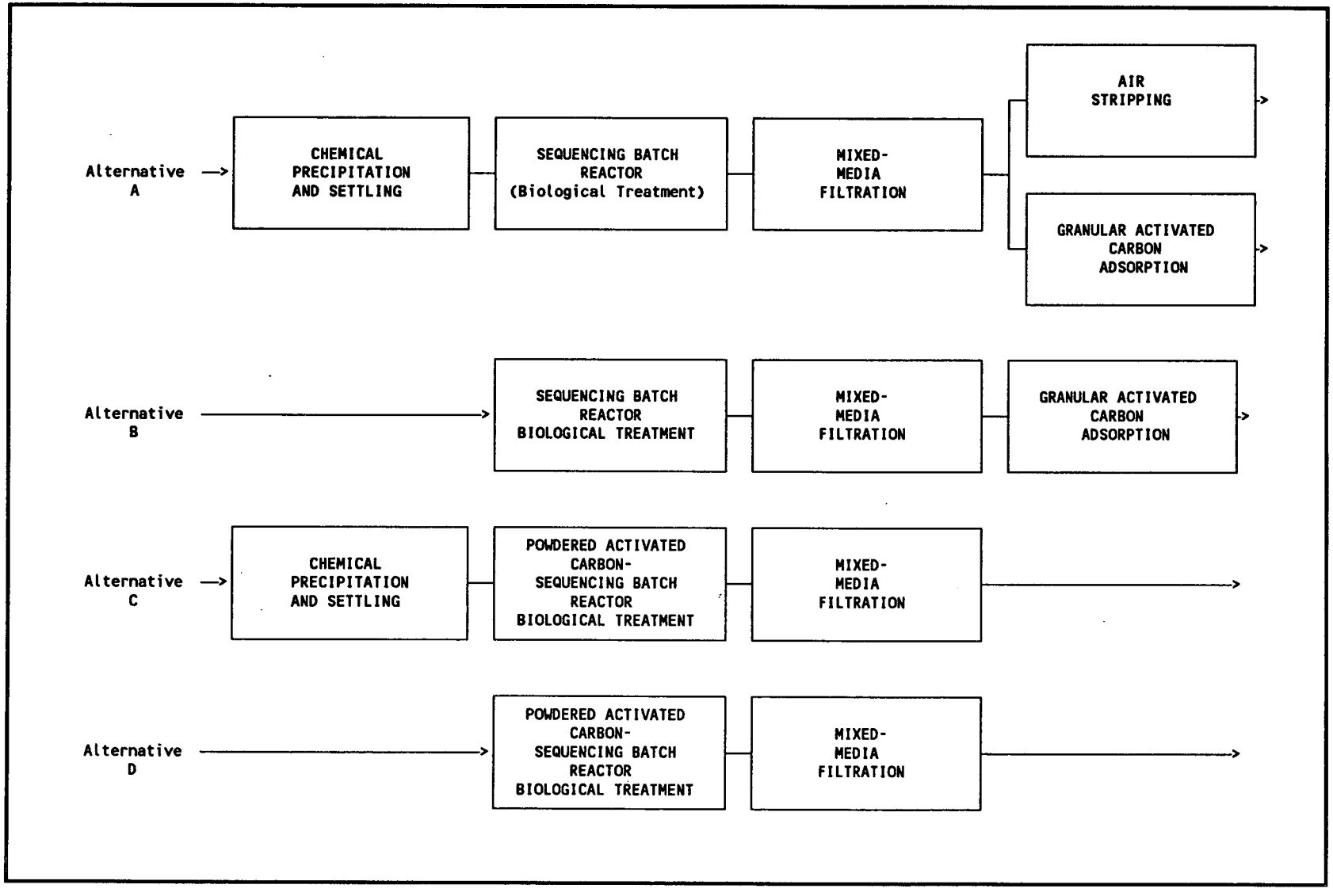


Figure 7

Appendices

O'BRIEN & GERE

ATTACHMENT A

Correspondence Regarding Comments on Field Sampling and Testing Plan

cc: JJK
GAS
AJC
FILE: 5013.012 #2

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS SITE MITIGATION
401 E. State St., CN 413, Trenton, N.J. 08625
(609) 984-2902

Anthony J. Farro
Director

O'Brien & Gere Engineers, Inc.
Raritan Plaza 1
Edison, NJ 08837

ATTENTION: STEVE ROLAND, P.E.,
Managing Engineer

RE: COMBE FILL SOUTH LANDFILL
FIELD SAMPLING PLAN

Gentlemen:

We have reviewed your Field Sampling Plan and have the following comments.

From BESCM

1. Figures 2, 4 and 5 are illegible. Please redo with all details legible and preferably on a somewhat larger scale. Identify site boundaries. Use appropriate line widths for reproduction at the intended scale. If contour lines in steep slope areas are too close together for legibility it may be helpful to interrupt the small interval lines and show only the emphasized lines in those areas.

2. Section 6.02 Wastewater Characterization. Include analyses for all parameters listed in table 1 except bioassay and Ames test. Also include total and fecal coliform bacteria.

3. What material will you use for the treatability study? How will it be obtained, handled and stored?

4. Do you feel that the powdered activated carbon treatment will reduce organics to less than 5 ppb with a reasonable dosage of carbon? A dosage of 5000 ppm does not seem reasonable. Have you considered air stripping as a possible treatment?

5. Are sufficient upgradient aquifer data available now to enable estimation of groundwater migration into the landfill?

6. I doubt that one gas well on the fill and one at the periphery will be sufficient to produce representative data. Consider additional wells.

7. What is the rationale for selecting the gas pumping time and negative pressure to be used? Describe the procedure for monitoring well output without any negative pressure. I would be concerned that evacuation for more than a week would induce infiltration of outside air which would dilute the gas. Please explain the method to be used in selection of gas well spacing and any assumptions to be used.

8. While readings on field instruments such as an explosimeter and PID are appropriate for much of the gas sampling a more extensive list of parameters should be analyzed for at least once at each point. This would include the TCL volatiles, methane, oxygen, nitrogen, carbon dioxide, hydrogen sulfide, hydrogen cyanide, mercaptans and other odoriferous compounds typically found in landfill gases.

9. Indicate the locations you plan to test for capping materials. In testing clay for capping consider the use of the standard Proctor test or other test with lower effort than the modified Proctor. For a discussion of this point please see the EPA publication "Covers for uncontrolled hazardous waste sites", page 3-23 and the references given there. Also consider testing for dispersivity and shrink/swell behavior.

10. Do you plan any foundation borings for the leachate treatment plant site? What testing is planned to determine whether the plant site is a wetland or not. Will you need any geotechnical work for the alternate access route?

11. Will you need any sampling and testing to assist in evaluating the potential for differential settlement?

From BEERA

Please refer to the enclosed memo dated 6 May 1988 from Mike Hornsby.

From DEQ

Please refer to the enclosed memo dated 28 April 1988 from R. Yeates.

From USEPA

Please refer to the enclosed letter dated 27 April 1988 from Raimo Liias.

From BSO

Please refer to the enclosed memo dated 28 April 1988 from Paula Gibson.

From DWR

Please refer to the enclosed memo dated 10 May 1988 from Daniel S. Fisher.

If you have any questions on these comments please feel free to discuss them with me or the respective reviewers.

Very truly yours,

Edmund Taylor, P.E.,
Site Manager
Bureau of Engineering Services
and Contracts Management

HS231:ms

Encls.

c. M. Hornsby, BEERA
File C 3

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS SITE MITIGATION
401 E. State St., CN 413, Trenton, N.J. 08625
(609) 984-2902

Anthony J. Farro
Director

MEMORANDUM MAY 06 [illegible] MAY 06 1988

TO: ED TAYLOR, SITE MANAGER, BESCM-DHSM

FROM: MIKE HORNSBY, TECHNICAL COORDINATOR, BEERA-DHSM

SUBJECT: REVIEW OF DRAFT FIELD SAMPLING AND TESTING PLAN FOR COMBE FILL SOUTH LANDFILL

Site Description

The Combe Fill South Landfill consists of five million cubic yards of waste materials, covering about eighty acres. The site is located in a semi-rural area of Chester and Washington Townships, Morris County. Since the 1940's, the site was used for the disposal of municipal waste, industrial wastes, sewage sludge, septic tank wastes, chemicals and waste oils. The site was closed in 1981. In 1983, the site was placed on the NPL. An RI report was issued in May 1986. A FS report was issued in January 1987. The remedial alternative selected for the site includes an alternate water supply, a RCRA cap, gas collection and treatment, groundwater and leachate collection and treatment. Groundwater, potable water wells, surface water and sediments are contaminated with organic chemicals. A municipal water line installation within a NJDEP well restriction area was announced at a public meeting in June, 1987.

Comments

The draft FSTP will provide the basis for an acceptable final FSTP with the inclusion of the following comments.

1) p. 2-3, para. 1
The FSTP states that "all drill cuttings will be left on the ground surface at the well site". The drill cuttings should be scanned with a PID as they are produced. If the cuttings measure less than 5 ppm below background on the PID, they may be left on the ground surface. If the cuttings measure greater than 5 pmm above background, they should be taken onto the landfill for disposal.

2) p. 4-2, para. 1
Two gas pumping wells have been proposed: one on the landfill and one on the landfill perimeter. Figure 2-8A of the Conceptual Design Report shows that all the permanent gas recovery wells are located on the fill proper. Additional justification for the perimeter well should be provided.

Combe South consists of the pre-1972 area and the post-1972 area (Fig. 1-4, Final RI Report, LMS, May 1986). The gas generation capacity of the old vs. new fill areas are probably different. Therefore a gas pumping test well should be included in both areas.

3) p. 4-4, para. 2
Landfill gases from the landfill gas pump test will be vented to the atmosphere. This will require a permit waiver from DEQ. You should request a waiver at this time.

4) p. 5-3
Borrow soils were proposed to be tested for a very limited range of metals. The list of metals should be expanded to PP metals or TCL metals as a precaution.

5) PAC was proposed to be added to the treatment plant flow at a rate of 5000 mg/l. The cost of this proposal may be prohibitive.

6) p. 6-7. The proposal calls for sludge from the on site treatment plant to be transported to the Par-Troy sewage treatment plant. Par-Troy may resist this proposal and delay the project. Par-Troy should be contacted now if they have not been already to discuss this matter.

7) A bioassay will be a requirement of the NJPDES permit waiver. However, a bioassay has not been proposed in the treatability study. This should be included.

<u>Recommendations</u>

Include these comment in a letter to the contractor, requesting they be incorporated into the final FSTP.

HS241/pw
cc: Dan Fisher
Dr. Peter Brussock

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF ENVIRONMENTAL QUALITY
401 East State Street
CN 027
Trenton, N.J. 08625
(609) 984-6721

Jorge H. Berkowitz, Ph.D.
Director

William O'Sullivan, P.E., Assistant Director
Air Quality Engineering and Technology

MEMORANDUM 4/28/88

TO E. TAYLOR, SITE MANAGER
THROUGH I. ATAY
FROM R. YEATES

SUBJECT COMBE SOUTH LF/DRAFT FIELD SAMPLING PLAN

We have some questions on the landfill gas sampling program. Basing the design of a gas collection system on only one test well seems risky. [The perimeter well will be atypical and of little value for system design although it will tell something about gas migration.]
Also, while the test procedure looks good we are concerned about the operation of the blower for over a week with no control of emissions. This could cause odor problems. Could not activated carbon be used?
We require that a memo or letter of approval, rather than the standard air pollution control permit, be obtained for such short term testing or pilot plant work. [Short term means less than 30 days] In order to obtain such approval a request letter should be sent to I. Atay of the Bureau of Engineering and Regulatory Development, DEQ, briefly describing the project and listing the expected emissions into the air.

CC F. COSOLITO
M. HORNSBY, BEERA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

APR 27 1988

Ed Taylor
Bureau of Engineering Services
and Contract Management
New Jersey Department of
Environmental Protection
401 East State Street
Trenton, New Jersey 08625

Dear Ed:

Please find enclosed a few comments on the Draft Interim Environmental Monitoring Plan and the Draft Field Sampling and Testing Plan for the Combe Fill South Superfund site. I understand you are compiling comments from a number of governmental review agencies and will forward these comments to O'Brien and Gere, the design contractor.

I also understand that all reviewers will have an opportunity to review the "updated" drafts of these two plans on May 17, 1988 at our next project meeting before there plans are finalized and accepted.

I have provided no comments on the Quality Assurance Project Plan, although there are some typographical and grammatical errors which I trust O'Brien and Gere will correct. If you should have any questions regarding these comments please do not hesitate to call me at (212) 264-8099.

Sincerely yours,

Raimo Liias

Raimo Liias, Project Manager
Northern New Jersey Remedial Action Section

IEMP

Page 1 Sect. 1.01 line 3

Samples should be collected during design and construction phase.

Page 5 Sect. 2.02 ¶ 4

Most wells in the area actually tap the fractured bedrock aquifer at depths of approximately 150'

Page 5 Sect. 2.02 ¶ 5 line 2

Puncturated = ? word ?

Page 9 Sect. 3

Air monitoring program seems rather extensive. How does this program compare with minimum requirements?

Page 14 Sect. 4.03 last ¶

Marking may be insufficient to re-establish sampling stations. Any alternative markings possible? Location map (i.e., Fig. 1) does not adequatey locate each sampling station. E.g., samples ought to be taken upstream of any road crossing. This procedure is not explicitly stated w/in the field sampling plan.

Page 17 Sect. 5.02 last line

Construction details of a few of the existing monitoring wells are poor to non-existent. What about sampling more adequately documented residential wells, instead of the poorer on-site monitoring wells?

Page 19

All wells should have basic parameters (i.e., depth to water table, ph, temp. etc.) measured during each sampling round.

FS and TP

Page 2-2 Sect. 2.03 ¶ 2 line 5

Galvanized well construction. What is the possibility of combining/incorporationg the new test wells in the Interim Environmental Monitoring Plan? Hence stainless steel would be considered the appropriate casing material.

line 6 and 7,

Why is a slot size specified for the 2" PVC observation wells while the slot size is dependent on RI/FS results for the 4" test well.

Page 2-3 Sect. 2.03 ¶ 1 line 7

Are New Jersey regulations being followed by leaving cuttings on the ground? Same question concerning discharge of development waters.

Page 2-3 Sect. 2.05 ¶ 3 line 1

Why use a stainless steel pump in a galvanized well?

Page 2-3 Sect. 2.03 ¶ 2 last 2 lines

The alternate approach should be specified in advance, as the percolation of pumped water may affect the test results. Also, discharge of groundwater may not allowed by New Jersey regulations.

Page 2-4 ¶ 1

Is there a dedicated probe for each of the 5 wells involved in each aquifer test? Are these wells all being recorded simultaneously by the microcomputer?

Page 2-6 Sect. 2.05 ¶ 1 line 7

Drive on Access - does this mean an ATV drilling rig or more typical drilling truck suitable for regular road travel?

Is the total time for this task 8 weeks?

Page 3-2 Sect. 3.02 ¶ 2 line 4

Is there a minimum depth +/or maximum depth of each pit?

Page 4-2 Sect. 4.02 ¶ 1

Gas testing Consult New Jersey guidance - (recently done on Combe Fill North project - rather detailed, rigourous procedures).

Number of wells seem low. Will this provide sufficient information to design entire system?

Page 6-6 Sect. 6.04 ¶ 1 lines 1-2

Sentence is confusing - verb ?

Page 6-6 Sect. 6.04 ¶ 2 lines 5-6

What manpower requirements are necessary to maintain treatability study reactors.

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS SITE MITIGATION
BUREAU OF SITE OPERATIONS

M E M O R A N D U M

APR 28 1988

TO: EDMUND TAYLOR, SITE MANAGER, BESCM

FROM: PAULA M. GIBSON, OSC, BSO

SUBJECT: COMBE FILL SOUTH LANDFILL REMEDIAL DESIGN
REVIEW OF DRAFT FIELD SAMPLING AND TESTING PLAN

O'Brien & Gere's (OBG) Field Sampling and Testing Plan failed to consider two (2) issues which were discussed at the progress meeting held on March 15, 1988: installation of additional gas test wells and provision of an on-site laboratory or a RCRA-permitted laboratory for the treatability studies.

Section 4, Gas Testing, specifies that only two (2) gas test wells will be installed. At the meeting both NJDEP and USEPA felt that installation of additional wells would result in a better representation of landfill gas production. If OBG considered this option and dismissed it, a technical explanation should be provided for the dismissal.

In Section 6, Treatability Studies, it should be specified whether an on-site laboratory will perform the required analyses. The name of the RCRA-permitted laboratory should be provided if this option is chosen.

In Section 6.04, Bench Scale Testing, two typographical errors are present. The figure referred to in this section should be Figure 6, not Figure 7. An incorrect pH of 98.5 is also listed; this should probably be 9.5.

If you have any questions or comments, please contact me at 4-2991.

HS239:mm2

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029
TRENTON, NEW JERSEY 08625

GEORGE G. McCANN, P.E.
DIRECTOR

DIRK C. HOFMAN, P.E.
DEPUTY DIRECTOR

Ground Water Quality Management

MEMORANDUM MAY 10 1988

TO: Edmund Taylor, Site Manager, Bureau of Engineering Services and Contract Management, Division of Hazardous Site Mitigation

THROUGH: Elizabeth Fernandez-Obregon, Supervisor, Kenneth Siat, Chief, Ground Water Quality Control, Ground Water Quality Management Element, Division of Water Resources

FROM: Daniel S. Fisher, Hydrogeologist, Ground Water Quality Control, Ground Water Quality Management Element, Division of Water Resources

SUBJECT: Comments on the Draft Field Sampling and Testing Plan and the Draft Interim Environmental Monitoring Plan

Draft Field Sampling and Testing Plan

(section 2.02, p. 2-1) The two observation wells should be placed such that they and the test well form a right angle with one side parallel to (and the other side perpendicular to) the strike of fracture orientation (N 50° E) in the bedrock.

(section 2.03, p. 2-3) In order to be consistent with the draft guidelines established by the Division of Hazardous Site Mitigation, potentially contaminated soils (or drill cuttings) from an unsecured site must be...

> "placed in either drums or secure containers (e.g., roll-offs, dumpsters). The drums will then be secured at the site (i.e., fenced or access by unauthorized persons prevented) or transported to a central secure location. A determination will then be made by DHSM as to whether additional analyses of the cuttings is required. This decision will be made based on the analytical results of the investigation. The materials will then be either disposed of in accordance with regulation or retained for treatment with other

materials as part of the selected remedy for the site."

Fencing would be a good first step since any one can enter the property without realizing the potential danger and since nobody seems to have the key for the existing fence across the access road.

Following the same guidance in reference to waters drawn from contaminated aquifers, the waters may be discharged to the ground surface if:

1) The water is not permitted to migrate off-site;

2) There is no potential for contaminating a previously uncontaminated aquifer; and,

3) The discharge will not cause significant additions to soil contamination.

I believe that none of these conditions will be violated if the water is discharged to the top of the landfill.

Also, a discharge permit will not be required since this is a publicly-funded project pursuant to SARA, Title 1, Section 121(e). Howevere, Obrien & Gere must follow the guidelines established by the Department and must document their compliance.

If the pump test water can be discharged to the ground surface, it should be not discharged in close proximity to the test or observation wells since the effect would be to introduce recharge into the aquifer.

(p. 2-4) How many wells can be monitored by the system? Will the test wells and existing monitoring wells (shallow and deep) be monitored? I recommend that as many shallow and deep wells as possible be monitored during the pump and recovery tests.

(section 5.03, p. 5-3) All potential borrow soils should be analyzed for total metals (As, Ag, Ba, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, and Zn) as well as the other parameters listed. However, Mg, K, Fe, and Mn may be deleted from the list because they are elements that occur naturally in high concentrations in soils and are not normally harmful to humans or the environment.

(section 6.02, p. 6-2) A sample is not normally taken from wells that are not designed for that purpose. However, the focus is on the quality of water coming from a pump and treat system of wells, not a monitoring well system. It should be noted that minor changes in the chemical character of the water may occur due to these conditions and must subsequently be dealt with in the actual design.

Draft Interim Environmental Monitoring Plan

(section 1.01, p. 2) Objectives 2 and 3 involve the evaluation and assessment of contaminants that have migrated off-site. Reference should be made to the findings of all available potable well sampling events. This will provide a clearer picture of the extent of off-site migration.

(section 4.03, p. 14) Samples of seeps draining into Trout Brook (water and associated sediment) should be taken where Long Hill Rd. crosses Trout Brook. In this way a determination can be made as to the nature and risk associated with the orange material found there. The samples should be analyzed in the same manner as the rest of the water and sediment samples. No data currently exists to assess any hazards that may be present in this residential area.

(section 5.02, p. 17) This plan does not include residential well sampling. The long-term monitoring program described in the Final Conceptual Design Report would be implemented only after the remediation is completed. This would give us no information with which to assess the immediate threat to current well owners within the Well Restriction Area (WRA). Since the Department does not currently have the authority to seal all existing wells in the WRA, some well owners may still be drinking the ground water despite the warnings issued repeatedly to the contrary. Furthermore, since the ROD called for "appropriate environmental monitoring to ensure the effectiveness of the remedial action", I recommend that the Department establish and implement (independently of the design phase of the project) a ground water monitoring system as soon as possible at strategic points around the landfill and near the borders of the existing (WRA). This monitoring program would provide a baseline of pre-remediation data with which to compare the data generated after the remediation is completed.

(table 1, p. 10 of 12) All descriptions of filtering protocols of metals samples should include any deleterious effects on sample integrity inherent in the procedure. For example, vacuum pumps may change the chemical nature of the sample by depressurizing the sample during filtration. The method that best maintains sample integrity should be chosen.

Also, procedures should be included to decontaminate the filtering apparatus between each well.

(Appendix 4, GW Sampling Procedure 16) Metals samples must be filtered and preserved in the field. Water chemistry can change in a matter of hours when taken from their "natural" environment without filtering and subsequent preservation.

c: Mike Hornsby, Technical Coordinator, BEERA, 6th floor
Paula Gibson, On-Site Coordinator, BSO, 25 Arctic Pkwy.
Irene Kropp, Superfund Coordinator, 4th floor
Frank Cosolito, DEQ Coordinator, 2nd floor

cc: AJC
JJ KEEGAN
File 3013.012 #2

RECEIVED
JUN 17 1988
O'B & G
EDISON

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS SITE MITIGATION
401 E. State St., CN 413, Trenton, N.J. 08625
(609) 984-2902

Anthony J. Farro
Director

14 JUN 1988

O'Brien & Gere Engineers, Inc.
Raritan Center
Plaza One
Edison, NJ 08837

ATTENTION: STEVE ROLAND, P.E.,
MANAGING ENGINEER

RE: COMBE FILL SOUTH LANDFILL WORK PLAN

Gentlemen:

We have reviewed your revised Work Plan and have the following comments:

1. Section 2. Many of the scheduled dates have passed and are no longer relevant. It is suggested that you delete the dates and show only the durations of the subtasks.

2. Section 2.08 and 2.09. Since the construction and operation of the treatment plant will be major cost items in the remediation of this site the treatability testing and design of the treatment plant should receive more attention in the work plan. The treatability testing should be discussed in at least as much detail as it was in your original proposal. It is requested that you also consider air stripping as a candidate treatment process. A duration of 6 1/2 months for the treatability testing seems excessive. Can this time be shortened? We are asking DWR to confirm that the effluent limitations given in the Conceptual Design Report are still applicable.

3. Section 2.15. The topo map should show property boundaries.

4. Discuss the permit applications that will be needed.

5. On page 3-2 and Figure 1 the approved laboratory should be indicated rather than OBG Laboratories which has not been approved.

6. Page 2-4. Please address our previous comments on the gas collection and treatment system.

Very truly yours,

Edmund Taylor,
Site Manager
Bureau of Engineering Services
and Contracts Management

HS231:ms

c. Mike Hornsby
File C3

CC: AJC GRACCIOLO
JJ KEEGAN
RD JONES
JK FARMER
GA SIMPSON
SW ANAGNOST
SA CHRISTIE

O'B & G FILE: 3013.012 #2

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS SITE MITIGATION
401 E. State St., CN 413, Trenton, N.J. 08625-0413
(609) 984-2902

Anthony J. Farro
Director

29 JUN 1988

O'Brien & Gere Engineers, Inc.
Raritan Center
Raritan Plaza One
Edison, NJ 08837

ATTENTION: STEVE ROLAND, P.E.,
MANAGING ENGINEER

RE: COMBE FILL SOUTH LANDFILL FIELD SAMPLING PLAN

Gentlemen:

This is in reply to your letter of 15 June dealing with our comments on your Field Sampling Plan.

BESCM Comments

5. According to your statement limited data are available on the upgradient aquifer characteristics. If you do not plan any test pumping in that area please explain how you will obtain the appropriate information on the ground water inflow.

9. Desktop research on borrow sources should be completed as part of Task 1 so that you can proceed under Task 2 to do any confirmatory field and laboratory work.

Please give a description, justification and a more complete reference to the "15 blow modification" to the standard Proctor test.

BEERA Comments

4. Your response is satisfactory.

7. Since a bioassay will be part of the effluent limitations you should include that test as a part of the treatability testing. The procedure to be followed is given in NJAC 7:18-6 which deals with laboratory certification.

USEPA Comments

Page 2-2. Your response is satisfactory.

Page 2-3 Section 2.03. The disposal of pump test water by infiltration into the landfill should be feasible if the disposal point is a suitable distance away from the pumping well. You should be able to specify a suitable minimum distance or disposal point in your Plan so that your driller will be adequately prepared.

Page 3-2. Your response is satisfactory.

Page 4-2. For information on the acceptable procedures for gas testing please consult with Ed Choromanski of the Division of Environmental Quality, telephone 609/530-4066. At the project meeting on 21 June you were also given the opportunity to review a report on gas sampling prepared for another site.

DWR Comments

Page 2-1. Your response is satisfactory. The observation wells should be sited as you recommended.

Page 2-4. Your response is satisfactory.

Please proceed to finalize your report. If you have any questions or wish to discuss these comments, feel free to contact me or the respective reviewers.

Very truly yours,

Edmund Taylor, P.E.,
Site Manager
Bureau of Engineering Services
and Contracts Management

HS231:ms

c. Mike Hornsby
File C 3

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS SITE MITIGATION
401 E. State St., CN 413, Trenton, N.J. 08625
(609) 984-2902

Anthony J. Farro
Director

AUG 0 3 1988

O'Brien & Gere Engineers, Inc.
Raritan Plaza
Edison, NJ 08837

Attn: Mr. Steve Roland, P.E.

Re: Combe Fill South Landfill - Field Sampling Plan (FSP)

Gentlemen:

We have reviewed your revised FSP and have the following commments:

From BESCM

1. Section 2. Aquifer performance testing. Our previous comment No. 5 dealing with groundwater migration into the landfill has still not been addressed.

2. Provide justification for installing new test wells instead of pumping from existing monitoring wells. Identify specifically the existing monitoring wells near the proposed new wells. For how long do you intend to pump the wells continuously?

3. Section 3. Fill delineation. It appears that you plan to redo the same Geonics EM-31 survey that was done for the RI. There was also an earlier survey in 1982 as well as test pits. Additional recently discovered test pit information was handed to you at our meeting of 19 July. Please discuss the results and limitations of the previous work and explain what information is still missing and how you intend to fill these gaps.

4. Gas testing. Please give a more specific reference than "Table 1 of the NJDEP Administrative Code". If reasonably possible, please include the following malodorous compounds in the volatile organics testing:

   Butyl benzenes
   Propyl benzenes
   Methanethiol
   Dimethyl disulfide
   Ethyl butanoate
   Butan-2-ol

5. Materials evaluation. Our previous comment No. 9 dealing with the planning of your field work has still not been addressed.

6. Treatability studies. Please note that we are investigating the possibility that the groundwater to be used in the treatability testing may be considered non-hazardous and hence can be handled and shipped without manifesting and permitting.

7. The references you give are not sufficient to identify the sources. Please give adequate references or better, copies of the source documents, particularly that of Ying describing the sequencing batch reactor.

8. It is not clear how you can evaluate Alternative B without actually operating a test train. Please explain.

9. Figures 4 & 5. It is hoped that these figures do not typify O'Brien & Gere's usual standard of quality for exhibits.

From BEERA

Please refer to the enclosed memo dated 29 July from Mike Hornsby.

If you have any questions about these comments please feel free to contact us to discuss them.

Very truly yours,

Edmund Taylor, P.E., Site Manager
Bureau of Site Management - Region II

HS231:dc

Enclosure

c. Mike Hornsby
File C3

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS SITE MITIGATION
401 E. State St., CN 413, Trenton, N.J. 08625-0413
(609) 984-2902

Anthony J. Parro
Director

MEMORANDUM

JUL 29 1988

TO: ED TAYLOR, SITE MANAGER, BESCM-DHSM

FROM: MIKE HORNSBY, TECHNICAL COORDINATOR, BEERA-DHSM

SUBJECT: REVIEW OF THE FIELD SAMPLING AND TESTING PLAN (SECOND DRAFT) FOR THE COMBE FILL SOUTH LANDFILL

Site Description

The Combe Fill South Landfill consists of five million cubic yards of waste materials, covering about eighty acres. The site is located in a semi-rural area of Chester and Washington Townships, Morris County. Since the 1940's, the site was used for the disposal of municipal waste, industrial wastes, sewage sludge, septic tank wastes, chemicals and waste oils. The site was closed in 1981. In 1983, the site was placed on the NPL. An RI report was issued in May 1986. A FS report was issued in January 1987. The remedial alternative selected for the site includes an alternate water supply, a RCRA cap, gas collection and treatment, groundwater and leachate collection and treatment. Groundwater, potable water wells, surface water and sediments are contaminated with organic chemicals. A municipal water line installation within a NJDEP well restriction area was announced at a public meeting in June, 1987.

Document Description

The purpose of the FSTP is to plan activities necessary to design the remedial treatment system: aquifer tests, gas tests, fill delineation, material evaluation and treatability studies. The FSTP was prepared by the DEP consultant O'Brien and Gere Engineers (OBG). This was a second draft.

Comments

1. The Combe South ROD prescribes biological treatment of ground water. OBG proposed only the sequential batch reactor (SBR) in the FSTP (as well as their bid proposal). No consideration given to more conventional biological processes, such as activated sludge or rotating biological contactors (RBCs). These processes should also be considered in addition to the SBR.

2. P. 6-6, para. 2 - A dosage rate of 125 mg/l of powdered activated carbon was specified for the SBR. An objective of the treatability study should be to optimize the carbon dosage rate. Multiple dosage rates should be used.

3. P. 6-6, para. 3 - Samples will be collected from the operating SBR when"steady state" conditions are attained. An OBG representative said steady state will be determined utilizing MLSS and TOC analysis. OBG should also explore the possibility microbiological population surveys to determine if steady state conditions exist.

4. P. 6-7, para. 3 - Four different treatment alternatives are proposed. Only two of the alternatives include treatment by granular activated carbon units and two don't. An air stripping treatability study is proposed for one of the alternatives which already includes activated carbon. This should also be considered for one of the alternatives that will not use the activated carbon. The air stripper was not illustrated in Figure 7 - it should be included.

Recommendations

Send these comments in a letter to OBG, requesting a written response.

HS241/pw
cc: Thomas Gillespie, BEERA
Dan Fisher, DWR